i-Cobb - An Innovative Technique In Spinal Radiographic Measurement

INTRODUCTION

The measurement of Cobb angles from radiographs is routine practice in spinal clinics. The technique relies on the use and availability of specialist equipment such as a goniometer, cobbometer or protractor. The aim of this study was to validate the use of i-Phone (Apple Inc) combined with Tilt Meter Pro software as compared to a protractor in the measurement of Cobb angles.(1,2)

METHODS

Between November 2008 and December 2008 20 patients were selected at random from the Paediatric Spine Research Groups Database. A power calculation was performed which indicated if n=240 measurements the study had a 96% chance of detecting a 5 degree difference between groups. All patients had idiopathic scoliosis with a range of curve types and severities. Patients were chosen at random. Two specialists, two spinal fellows, a specialist physiotherapist, a spinal orthotist and a training grade registrar measured 20 coronal plane radiographs on two different occasions at least 1 week apart. Measurements were first taken using the iPhone. A protractor and ruler were then used to measure a designated curve according to the standard Cobb technique. Participants were blinded to the results of previous measurement attempts.

RESULTS

Assessment of the 20 x-rays by seven observers, and repeat assessment by five of the observers, gave a total of 240 sets of measurements. One of these sets was excluded due to the observer not measuring the major curve, leaving 239 pairs of protractor/iPhone measurements. The mean Cobb angle for the entire group was 45.4deg (range 15-72deg), and the mean absolute difference between pairs of iPhone and protractor measurements was 2.1deg (range 0-8deg, SD 1.7deg). The mean absolute intra-observer difference between repeated protractor measurements was 2.1deg, while the mean absolute difference between repeated iPhone measurements was 2.3deg, suggesting that the intra-observer repeatability of the iPhone is equivalent to the protractor. The interobserver error (SD of the difference between measurements by 2 different observers) was the square root of 2 multiplied by the standard deviation=3.8deg for the iPhone, and 3.2deg for the protractor. The mean measurement time for the iPhone was 19 minutes, compared to 22.5 minutes for the protractor.

DISCUSSION

The i-Phone combined with Tilt Meter Pro software offers a faster alternative to the traditional method of Cobb angle measurement. The use of i-Phone offers a more convenient way of measuring Cobb angles in the outpatient setting. The intra-observer repeatability of the iPhone is equivalent to the protractor in the measurement of Cobb angles.

REFERENCES

1. Pruijs JE et al. Variation in Cobb angle measurements in Scoliosis. Skeletal Radiol 1994;23:517-20

2. Morrissy RT et al. Measurement of the Cobb Angle on radiographs of patients who have scoliosis. JBJS AM 1990;72:320-7